BIBLIOGRAPHY

LIGAW, GREGORIO L. APRIL 2012. Growth and Seed Yield of Three Corn Varieties Applied with Organic Fertilizers under La Trinidad, Benguet Condition. Benguet State University, La Trinidad, Benguet.

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ABSTRACT

The study was conducted at BSU Experimental area, Balili, La Trinidad, Benguet from January to June 2010 to evaluate the growth and seed yield of different corn varieties; determine the best organic fertilizer that could give improvement on seed yield in corn, determine the best combination of corn variety and organic fertilizer on seed production, and determine the economic benefits of producing corn applied with different organic fertilizers.

Chicken dung and carabao manure promoted higher corn seed yield. Among the three varieties tested, native corn was best performing in terms of growth, marketable seed yield and total yield under La Trinidad, Benguet condition.

Native corn applied with chicken dung produced the highest yield and profit under La Trinidad, Benguet condition.

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INTRODUCTION

Corn is second to rice in importance as a staple food (PCARRD, 1970). Corn grains are milled into corn grits and prepared as food for steaming like rice. It is also processed into flakes, oil, syrup and popcorn as well as a coffee substitute (Gagni and Tabinga, 1985).

In the Philippines highlands particularly in Benguet, Sweet corn and native corn are produced as cash crops among the farmers. Farmers usually use different kinds of corn varieties from their own previous crop (Mamuri, 2003).

At the present, the problem faced by the farmers is the high cost of chemical fertilizers. This situation greatly increases the farmer's investment in production. In view of this, the use of organic fertilizers appears to be very logical alternative in minimizing chemical or organic fertilizer inputs (Mamuri, 2003).

The use of organic fertilizers in corn production can lessen the expenses of farmers and ensure the vigorous growth of plants. It also influences nutrient absorption due to its role in granulation and improvement of the physical and chemical properties of the soil (Tamiray, 1997).

In addition, this study may serve as a useful guide for farmers engaged in corn production. It can lead to the production of high quality corn seeds which ensures increased production. Evaluation of different corn varieties may also lead the farmers to have other alternative corn varieties to plant.

The study was conducted to:

1. evaluate the growth and seed yield of different corn varieties under La Trinidad, Benguet condition;

2. determine the best organic fertilizer material that could promote vegetative growth and improve seed yield of corn;

3. determine the best combination of corn variety and organic fertilizers on seed production; and

4. determine the economic benefits of producing corn applied with different organic fertilizers.

The study was conducted at the Benguet State University Experimental Area, Balili, La Trinidad, Benguet from December 2009 to June 2010.

REVIEW OF LITERATURE

Soil and Climatic Requirements

Corn grows best on fertile, well-drained, clay loamy soil rich in humus and organic matter. However, if the field is not suitable for corn production, apply proper fertilizers and organic matter. Also we plant legumes such as mungbean, peanut, and peas to improve the fertility of soil. The soil at least 80 cm deep soil holds moisture and provides the needed nutrients for the plants. Corn grows well in a field that is slightly rolling and fairly deep such topography will minimize stagnant water in the field (Gagni and Tabinga, 1985).

Baluyot, *et al*. (1984) reported that corn is best adapted to well drained loamy soil with high organic matter and water holding capacity. It requires a pH ranging from 5.5 (rather acidic) to 8.0 (moderately) for the best production of corn.

Seed Production and Varietal Evaluation

According to Coscolan (1991), the proper selection of variety of corn to be planted is very necessary to increase its yield potential and the income of the farmers. In addition, varietal evaluation is necessary to observe the characters such as yield, earliness, maturity and keeping quality because varieties have a wide range of differences is size-yielding performance.

Reily and Shry (1991) reported that corn varieties must be adapted to the area in which it is grown; there is a great variation in the yielding ability of the different varieties when grown under the same method of culture. A variety that yields well in one region is not a guarantee that it will perform well in another region.

Adaptability of crop in the highlands differs relatively to elevation mainly because of temperature as well pest and diseases prevalence (SEARCA, 2002). Therefore, farmers must know if a variety can grow suitably in that particular area.

Corn Fertilization and Irrigation

Baluyot and Cox (1984) stated that to attain best yield of a variety, all the required nutrients must be available for the growth of corn plants. The amount of fertilizers recommend to apply is determined by the level of nutrient present in the soil. In most cases, nitrogen fertilizers is very important to produce high yield. A yield of 5-6 tons per hectare can be obtained in farmers field fertilized with 90-100 kg tons per hectare of nitrogen.

They further recommend basal application and side dressing of fertilizer during wet season. They recommend application of half of the recommend nitrogen and all the phosphorus 205 and potassium 20 in the furrows with 2-3 cm soil before planting.

According to Quilloy (1993), one important factor that affects corn yield is nitrogen fertilizers. Using high rates of fertilizers with adequate population will not increase yield unless there is sufficient supply of nutrients.

Fertilizers Requirement

Manure contains many essential plant nutrients especially phosphorous, potassium, calcium, magnesium, sulfur, zinc and others. Farm manure influences the soil as a nutrient and tends to increase crop yield and granulation that binds or lighten and expand soil aggregates making the soil porous. Corn varieties respond very well to nitrogen fertilizers (Banario, 1998).

Importance of Organic Fertilizers on the Soil

At present, farmers have many farm problems. One of which is low yield, thus farmers keeps figuring out ways to improve production and high profit. This can be realized by encouraging them to observe and keep environment-friendly practices such as the use of organic fertilizers (Javar, 2005).

Organic fertilizers generally provide many advantages to the farmers in terms of soil improvement and conservation, good yields and high quality of produce. This ensures reduction of production cost in the long run (Salda, 1999).

Tomilas (1996) reported that application of organic fertilizers in sufficient amount improves soil structure, serves to improve organic matter of the soil and increase not only the quality of nutrient elements for plant growth and development but also decrease bulk density of the soil. Organic matter in the soil can increase ware absorption and lesser water run-off leaching and erosion.

Pointcelot (1986) stated that organic farming is very important in improving soil fertility and replacing the costly inorganic fertilizers. The organic residues are easily available from decomposed weeds, straws and alnus compost. The fibrous portion of the organic matter improves the soil physical properties. Its loose property and high carbon content promote soil aggregation and improve the permeability and aeration of clay soils. Their high humus content granulates sandy soils and improved their nutrients and water holding capacity. Moreover, carbon in organic matter is the main source of energy for activity of soil microorganisms like rhizobia for nitrogen fixation and mycorrhizae for increasing the soil phosphorous content.

Effect of Organic Fertilizers

Organic materials effects on the soil are strongly influenced by the nature, their nutrient content, and the process of their decomposition in the soil. They increase soil fertility, balanced supply of nutrient and build up of organic matter. There is a diverse array of organic materials, which can be processed and composted for application in the farm. Most of these are known wastes but some are by-products that can be put to good use by simple processes or treatment such as composting (PCARRD, 2006).

Daoines (1994) stated that adding and returning organic matter to the soil is essential. It is only organic matter that can provide the necessary element for growing plants. The amount of humus in the soil decreases through mineralization, thus resupplying lost humus every year is a must for maintaining soil fertility and quality. Approximately eight tons convert to hectare, organic matter a year necessary for this purpose. To improve quickly the chemically spoiled soil, an initial addition of double this amount (16 tons/ ha) is recommended. Also applying animal manure improves the structures of the soil. This may be due to the presence of nutrient element in the organic matter. Also mentioned that C: N ratio may indicate the availability of N in organic matter since the lower C: N ratio the better is the availability of nitrogen. .

Eslay (1996) reported that application of chicken dung enhanced the growth of potato plants. She further explained that crops applied with chicken dung on basal had the highest marketable tubers and total weight compared with other fertilizers. This superiority of chicken dung may be attributed to more nutrients, and readily available nutrients and combination of both. Also, Bilango (1996) found that potato plants applied with organic fertilizers produce best yields.

Pandosen (1980) claimed that the application of organic matter effectively improve the physical properties of the soil decreased the bulk density of the soil which favored plant growth.

Application of Compost

Compost is commonly regarded as a soil amendment as well as a fertilizer by improving soil physical properties and promoting the growth of soil found compost may have beneficial effect goes beyond the nutrients it provides (Mamuri, 2003).

MATERIALS AND METHODS

An area of 225 m^2 was properly cleaned and prepared. The area was divided into three blocks to accommodate 45 plots with dimensions of 1 m x 5 m each. The experiment was laid out following 3x5 factorial in Randomized Complete Block Design with three replications. The different varieties served as factor A, and the different organic fertilizers served as factor B.

. The treatments were the following:

Factor A: Organic Fertilizers (OF)

O_1= No fertilizers

O_2= Alnus compost

O_3= Mushroom compost

O_4= Chicken dung (5tons/ha)

O_5= Carabao manure (5 tons/ ha)

Factor B: Varieties (V)

V_1 = Native corn

V_2 = KY Bright Jean

V_3 = Bighani

Planting was done in single row with the seeding rate of two seeds per hill at a distance of 50 cm between rows and hills.

To ensure good growth and yield, cultural management practices such as weeding, hilling-up, irrigation, disease and pest control were properly observed.

Data Gathered

1. Agro-climatic data. Temperature, relative humidity, sunshine duration and rainfall amount was taken during the conduct of the experiment from Philippine (PAG-ASA) station, La Trinidad, Benguet.

2. Days from sowing to emergence. This was recorded when at least 50% of the seeds emerged.

3. Days from emergence to silking/tasseling. This was recorded when at least 50% of the plant per plot have extended tassel and silk.

4. Days from emergence to maturity. This was recorded by counting the number of days from emergence to harvesting of dried ears.

5. Initial plant height (cm). This was measured from the base of the plant at ground level to the tip of the youngest shoots, using ten samples per plot one week after emergence.

6. Final plant height (cm). This was measured from the base of the plant at ground level to the youngest shoot before harvesting using ten samples per plot.

7. Height of plants at first ear (cm). This was taken by measuring the base of the plant up to the base of the first ear one week after ear emergence.

8. Length of corn ear (cm). This was recorded by measuring ten sample ears per plot selected at random measured from the base to the tip using foot rule.

9. Ear diameter (cm). This was gathered by measuring ten sample ears per plot using vernier caliper.

10. Seed width (mm). Seed width was taken by measuring the mid portion of seed using a vernier caliper.

11. Seed length (mm). This was obtained by measuring the seed parallel to the hilum.

12. Seed color. This was taken using visual observation.

13. Weight of marketable seeds/plot (kg). This was obtained by weighing the marketable seeds. Marketable seeds are good and smooth, well-formed seeds and free from damages.

14. Weight of the non-marketable seeds/plot (kg). This was obtained by weighing all the damaged seeds, small sized, malformed and damaged by diseases.

15. Computed seed yield per ha (kg). This was obtained by weighing the seeds per plot into hectare basis using ratio and proportion:

Yield/ton/h = Total yield per plot x 2

16. Pest and disease reaction. This was assessed by rating the degree of disease and insect damage on the crop.

a. Reaction to corn borer. The reaction to the damage of corn borer on the different varieties was evaluated using the following scale:

Rating	Description	Remarks
1	Less than 1% damaged	Highly resistant
2	1-5% damaged	Moderately resistant
3	6-10% damaged	Resistant
4	11-20% damaged	Susceptible
5	21-30% damaged	Very susceptible

b. Reactionto downy mildew. Occurrence of downy mildew in each variety was obtained by using this formula:

$$\% \text{ Infection Index} = \frac{\text{No. of Plants Infected/Plot}}{\text{Total No. of Plants/Plot}} \times 100$$

Rating	Description	Remarks
1	No infected or less than 10%	Resistant
2	10% of plant infected	Moderately resistant
3	11-50% of plant infected	Susceptible
4	5% or nearly all the plants infected	Highly susceptible

17. Return on cash expenses. This was computed by subtracting the total expenses from the gross sales divided by the total expenses multiplied by 100 as follows:

$$\text{ROCE } (\%) = \frac{\text{Gross Sales - Total Expenses}}{\text{Total Cost of Production}} \times 100$$

Analysis of Data

All the quantitative data measured in this study were statistically analyzed using 3x5 factorial in Randomized Complete Block Design (RCBD) with three replications. The significance of difference among treatment means was tested using Duncan`s Multiple Range Test (DMRT) at 5% level of significance.

RESULTS AND DISCUSSION

Meteorological Data

The monthly temperature, relative humidity, amount of rainfall, and light throughout the conduct of the study are shown in Table 1. It was observed that the minimum temperature (12.20^{o}C) was noted during the month of February, while the maximum temperature of 26.80^{o}C was observed in the month of May. The minimum relative humidity of 71% was observed in the month of March while the maximum relative humidity of 80% was observed during the month of May to June. The foregoing conditions were suitable for corn growth. The low rainfall from January to March was compensated by supplemental irrigation.

Table 1. Temperature, relative humidity, rainfall, and sunshine duration

MONTH	TEMPERATURE Min. (^{o}C)	TEMPERATURE Max. (^{o}C)	RELATIVE HUMIDITY (%)	RAINFALL (mm)	SUNSHINE DURATION (min)
January	12.50	24.10	85	T	205.00
February	12.20	25.60	84	00	389.70
March	13.80	25.30	71	0.03	332.90
April	16.10	26.30	84	4.60	284.60
May	17.20	26.80	89	6.90	288.60
June	17.50	26.00	89	13.60	233.80

Source: PAGASA Station, BSU, La Trinidad Benguet

Initial Plant Height

Effect of organic fertilizers. Table 2 also shows the initial height of corn plant as affected by the application of different organic fertilizers. Statistically, no significant differences were observed on the height of the two corn varieties applied with different organic fertilizers at one week after emergence.

Varietal effect. Statistical analysis revealed no significant differences among the three corn varieties at one week after planting. Plant height varies with variety (IRRI, 2003) and is governed by a number of genes (Ashikari *et al.*, 2005). Differences between varieties may be due mainly to genetic attributes thus, the varieties could be genetically similar with respect to plant height.

Interaction effect. No significant interaction effect of organic fertilizers and corn varieties were noted on the initial plant height of corn.

Final Plant Height

Effect of organic fertilizers. Table 2 shows the height of corn plant as affected by the application of organic fertilizers. Significant differences among the organic fertilizers used were observed. Plants applied with chicken dung and carabao manure were the tallest.

Varietal effect. It was observed that Ky Bright Jean and native corn were taller than Bighani indicating that the latter maybe less adapted than the other two varieties under La Trinidad condition.

Interaction effect. No significant interaction was observed among the corn varieties and organic fertilizers on the final plant height of corn (Table 2).

Table 2. Initial and final height and height of plant at first ear of corn varieties applied with organic fertilizers

TREATMENT	HEIGHT (cm)		
	INITIAL (14 DAP)	FINAL (130 DAP)	AT FIRST EAR (80 DAP
Organic Fertilizer			
No fertilizer	6.96	133.78[b]	38.84[b]
Alnus compost	7.01	136.82[b]	46.42[b]
Mushroom compost	7.19	145.57[b]	49.42[b]
Chicken dung	7.60	178.70[a]	69.39[a]
Carabao manure	7.11	152.73[a]	53.58[b]
Variety			
Native corn	7.11	151.56	59.84
Ky Bright Jean	7.26	152.47	53.56
Bighani	7.15	144.53	41.11
a x b	ns	Ns	ns
CV(%)	3.24	10.26	17.73

Means with the same letter are not signficantly different at 5% level of significance (DMRT)

Plant Height at First Ear (cm)

Effect of organic fertilizers. Significant differences among the organic fertilizers were observed on the plant height at first ear.

Varietal effect. No significant differences were observed on height at first ear (59.84 cm).

Interaction effect. No significant interactions were observed between the corn varieties and organic fertilizers on the height of the first ear (Table 2).

Days from Sowing to Emergence

Effect of organic fertilizers. Organic fertilizers did not significantly affect the emergence of corn plants.

Varietal effect. All the corn varieties emerged 8 days after planting.

Days to Silking and Tasseling

Effect of organic fertilizers. Table 3 shows the days to silking and tasseling as affected by organic fertilizers. Highly significant differences were observed among the treatments on the days to silking and tasseling. Plants applied with chicken dung tasseled and silked 68 days after planting (DAP) which was 6-10 days earlier than the others. This could be due to the relatively high nitrogen content of chicken dung (3.8%) based on the source of nutrient as cited by Tacon (1987).

Varietal effect. Among the three varieties of corn tested, native corn showed earlier tasseling and silking by about 6 days over the other varieties (Table 3). This could be attributed to varietal characteristics of the plants evaluated. The native corn seem to be earlier maturing than the two other varieties when grown under warm temperature.

Interaction effect. No significant interaction effect of the corn variety and fertilizer on the days to tasseling and silking of corn was observed, although the widest difference between combinations was more than 2 weeks.

Days to Maturity

Effect of organic fertilizers. There were also no significant differences observed on the number of days from planting to maturity among the organic fertilizers used.

Table 3. Days to silking/tasseling and to maturity of corn varieties fertilized with organic fertilizer

TREATMENT	DAYS TO SILKING/TASSELING	DAYS TO MATURITY
Organic Fertilizer		
No fertilizer	76[a]	138.59
Alnus compost	74[a]	138.97
Mushroom compost	78[a]	138.74
Chicken dung	68[b]	138.88
Carabao manure	75[a]	138.80
Variety		
Native corn	70[b]	138.77
Ky Bright Jean	76[a]	138.78
Bighani	77[a]	138.84
a x b	ns	ns
CV(%)	4.69	0.27%

Varietal effect. No significant differences among the three corn varieties used in the study were revealed. All varieties matured in 138 to 139 days.

Interaction effect. No significant interaction was observed among the corn varieties and organic fertilizer.

Corn Ear Length

Effect of organic fertilizers. Corn ear length as affected by the different fertilizers is shown in Table 4. Highly significant differences among the treatments were observed. Plants applied with chicken dung produced longer ear than those plants applied with other fertilizers. Chicken dung presumably contain a good balance of nutrients suitable for earlier silking/tasseling as well as enhancing longer and bigger ears in corn.

Table 4. Ear length and ear diameter of corn varieties applied with organic fertilizers

TREATMENT	EAR LENGTH (cm)	EAR DIAMETER (cm)
Organic Fertilizer		
No fertilizer	12.90[bc]	4.84[b]
Alnus compost	12.18[c]	4.83[b]
Mushroom compost	13.24[bc]	5.07[ab]
Chicken dung	16.81[a]	5.47[a]
Carabao manure	14.80[ab]	4.87[b]
Variety		
Native corn	11.44[b]	4.81[b]
Ky Bright Jean	14.83[a]	5.09[a]
Bighani	15.69[a]	5.15[a]
a x b	ns	ns
CV(%)	8.74	3.23

Varietal effect. Highly significant differences were observed on the ear length of the different corn varieties. Bighani produced longer corn ears than native corn but was similar to Ky Bright Jean (Table 4). Bighani appear to have actually better potential under cool conditions despite of its lower stature.

Interaction effect. No significant interaction was observed between the corn varieties and organic fertilizers (Table 4).

Corn Ear Diameter

Effect of organic fertilizers. Table 4 shows the diameter of corn ear as affected by different organic fertilizers. Plants applied with chicken dung recorded the highest ear diameter of 5.47 cm. Plants applied with mushroom compost produced mean diameter of 5.07 cm. The narrowest ear diameter of 4.83 cm was obtained from the plants applied with Alnus compost.

Varietal effect. Among the three corn varieties evaluated, it was observed that Bighani and Ky Bright Jean varieties produced significantly wider corn diameter than Native corn, indicating the latter is much smaller than the other two varieties.

Interaction effect. No significant interaction effect was noted on corn ear diameter (Table 4).

Seed Length

Effect of organic fertilizers. The seed length of corn varieties as affected by organic fertilizers is shown in Table 5. It revealed highly significant differences among the treatments. Plants applied with chicken dung produced longer seeds than those plants applied with other fertilizers. The shortest seed length was obtained from the plants applied with carabao manure. This result further emphasizes the advantage of chicken dung over the other organic fertilizers when applied to corn.

Varietal effect. Statistical analysis showed that Bighani variety produced significantly longer seeds than the other varieties followed by Ky Bright Jean which has also longer seeds than the Native corn (Table 5).

Table 5. Length and width of seeds of corn varieties applied with organic fertilizers

TREATMENT	SEED	
	LENGTH (mm)	WIDTH (mm)
Organic Fertilizer		
No fertilizer	12.16[a]	8.80[b]
Alnus compost	12.09[a]	8.80[b]
Mushroom compost	12.04[a]	8.82[b]
Chicken dung	12.21[a]	8.90[a]
Carabao manure	11.56[b]	8.84[b]
Variety		
Native corn	10.53[c]	8.73[ab]
Ky Bright Jean	11.84[b]	8.84[ab]
Bighani	13.63[a]	8.93[a]
a x b	ns	**
CV(%)	0.75	0.75

<u>Interaction effect</u>. Variations among the interactions ranged from 10.50 mm to 13.90 mm but such variations were not sufficient to effect significant differences (Table 5).

<u>Seed Width</u>

<u>Effect of organic fertilizers</u>. Table 5 shows the seed width of corn varieties as affected by different organic fertilizers. Plants applied with chicken dung recorded the biggest seed width of 8.90 mm. The lowest width of 8.80 mm was obtained from the plants applied with Alnus compost and control or no fertilizer.

Varietal effect. Statistical analysis showed that Bighani variety produced significantly wider seeds with 8.93 mm, while the native corn has the smallest seeds with 8.73 mm. In terms of characteristic of seeds, Native corn seeds are smaller than the seeds of the sweet corn (Table 5).

Interaction effect. Highly significant interaction between variety and fertilizers on the seed width of corn was noted (Figure 1). Bighani applied with chicken dung had the widest seeds.

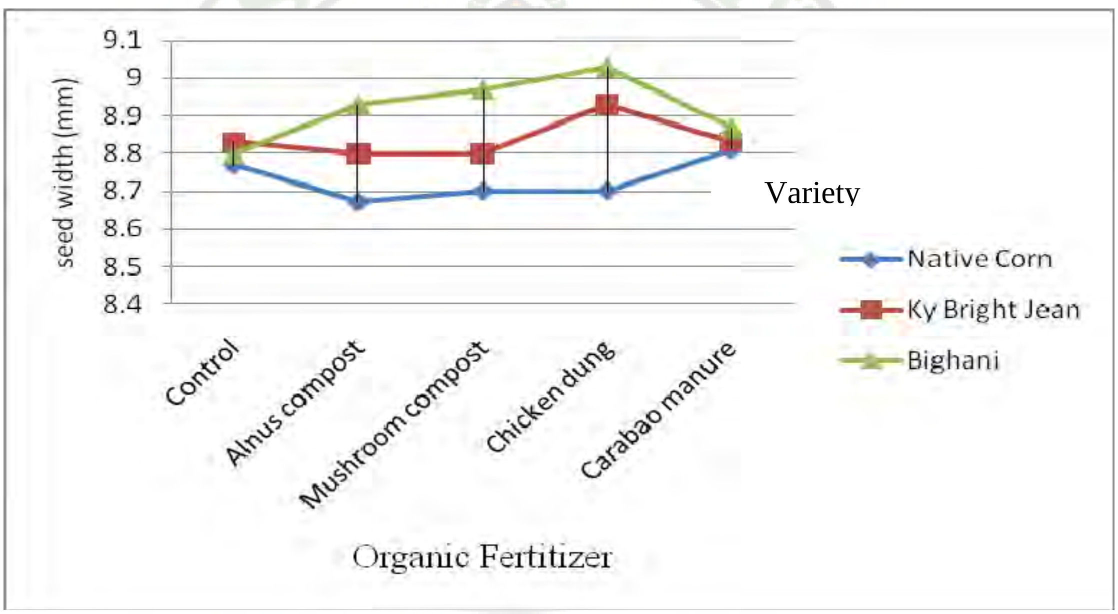


Figure 1. Seed width of corn varieties applied with organic fertilizers

Weight of Marketable Seeds

Effect of organic fertilizers. Highly significant differences were observed on the weight of marketable corn seeds. Plants applied with mushroom compost, chicken dung compost and carabao manure have comparable weights and they were markedly greater than those applied with alnus compost. Based on the source of nutrient, the different organic fertilizers like the mushroom compost, chicken dung compost and carabao manure had a high nutrient content than alnust compost.

Varietal effect. Based on the statistical analysis, significant differences were observed on the weight of marketable corn seeds. Native corn variety produced significantly heavier marketable seeds weighing 2.23 kg/plot followed by Ky Bright Jean varieties weighing 2.09 kg/plot (Figure 2). Bighani varieties had produced lighter marketable corn seeds per 5 m^2 per plot. Significant differences were observed on the weight of marketable corn seeds from the three corn varities studied (Table 6).

Interaction effect. No significant interaction between corn varieties and organic fertilizers used in the study was observed on weight of marketable seeds of corn.

Weight of Non-marketable Seeds

Effect of organic fertilizers. Plants applied with different organic fertilizers produced significant variations in terms of non-marketable seeds per $5m^2$ plot (Table 6). Plants applied with alnus compost, mushroom compost, chicken dung compost and carabao manure have comparable weights.

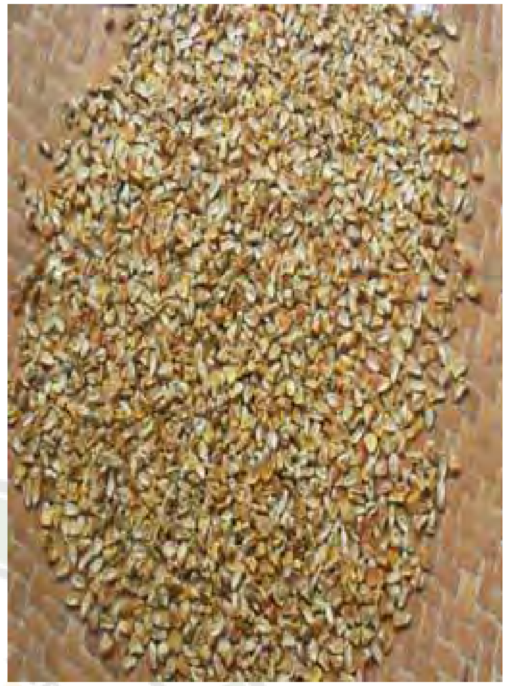
Varietal effect. Ky Bright Jean produced the least non-marketable seeds. The native corn produced significantly heavier non-marketable seeds weighing 0.39 kg/plot followed by Bighani weighing 0.20 kg/plot.

Table 6. Weight of marketable and non-marketable seeds per plot applied with organic fertilizers

TREATMENT	WEIGHT OF MARKETABLE SEEDS ($kg/5m^2$)	WEIGHT OF NON-MARKETABLE SEEDS ($kg/5m^2$)
Organic Fertilizer		
No fertilizer	2.00	0.20
Alnus compost	1.89	0.28
Mushroom compost	2.00	0.29
Chicken dung	2.37	0.30
Carabao manure	2.33	0.20
Variety		
Native corn	2.22	0.93
Ky Bright Jean	2.09	0.19
Bighani	2.04	0.20
a x b	ns	ns
CV(%)	3.07	19.96

Interaction effect. No significant interaction effect between the corn varieties and organic fertilizers were noted on the weight of non-marketable seeds. This indicates that organic fertilizers did not significantly interact in terms of weight of non-marketable seeds of the different corn varieties. It ranged from 0.16 kg/5m2 to 0.58kg/5m2 per plot.

Bighani



Ky Bright Jean

Native corn

Figure 2. Seeds of the three corn varieties applied with organic fertilizers

Reaction to Corn Borer
and Downy Mildew

Effect of organic fertilizers. Plants applied with different organic fertilizers did not vary from each other. All plants showed moderate resistance indicating that all organic fertilizer used could actually be used to partly prevent the occurrence of corn borer and downy mildew.

Varietal effect. All three corn varieties did not significantly differ from each other in terms of resistance to corn borer and downy mildew. The three varieties exhibited moderate resistance to corn borer and resistance to downy mildew. The low temperature and relative humidity that prevailed during the experiment did not favor occurrence of these insect pest and diseases.

Table 7. Reaction of corn varieties applied with organic fertilizers to corn borer and downy mildew

TREATMENT	CORN BORER	DOWNY MILDEW
Organic Fertilizer		
No fertilizer	Moderately resistant	Resistant
Alnus compost	Moderately resistant	Resistant
Mushroom compost	Moderately resistant	Resistant
Chicken dung	Moderately resistant	Resistant
Carabao manure	Moderately resistant	Resistant
Variety		
Native corn	Moderately resistant	Resistant
Ky Bright Jean	Moderately resistant	Resistant
Bighani	Moderately resistant	Resistant
a x b	ns	ns
CV(%)	3.07	19.96

Interaction effect. No significant interaction effect on both varieties and organic fertilizers used was observed.

Computed Yield per Hectare

Effect of organic fertilizers. Statistical analysis showed highly significant differences on computed yield per hectare among plants applied with organic fertilizers. Plants applied with chicken dung gave the highest computed seed yield of 5.458 tons/ha. It was followed by plants applied with carabao manure, alnus compost and mushroom compost. Plants with no fertilizer (control) produced the lowest computed seed yield per hectare of 4.17 tons/ha.

Table 8. Seed yield and computed seed yield of corn varieties applied with organic fertilizers

TREATMENT	SEED YIELD ($kg/5m^2$)	COMPUTED SEED YIELD (ton/ha)
Organic Fertilizer		
No fertilizer	2.08^{b}	4.17^{b}
Alnus compost	2.29^{b}	4.58^{ab}
Mushroom compost	2.25^{b}	4.50^{ab}
Chicken dung	2.59^{a}	5.46^{a}
Carabao manure	2.54^{a}	5.09^{ab}
Variety		
Native corn	2.76^{a}	5.67^{a}
Ky Bright Jean	2.10^{b}	4.20^{b}
Bighani	2.20^{b}	4.40^{b}
a x b	ns	*
CV(%)	14.32	12.20

Varietal effect. Statistical analysis revealed no significant differences on the computed seed yield per hectare. Native corn produced the highest yield followed by Bighani and Ky Bright Jean. The lowest computed yield per hectare of 4.20 tons and 4.40 tons was obtained from Ky Bright Jean and Bighani varieties (Table 8).

Interaction effect. It was observed that there was a significant interaction effect of varieties and different fertilizers used on the computed seed yield per hectare (Figure 3). Native corn applied with chicken dung significantly interacted in terms of seed yield.

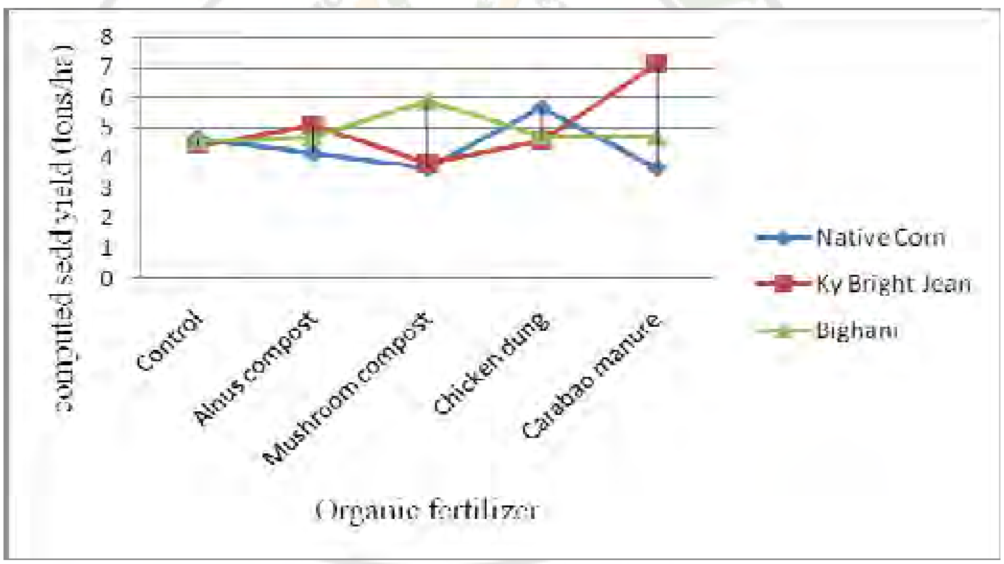


Figure 3. Computed seed yield per hectare (tons) of corn varieties applied with organic fertilizers

Total Weight of Seeds per Plot

Effect of organic fertilizers. Plants applied with chicken dung produced the heaviest weight of corn seeds per $5m^2$ but was statistically comparable with other varieties except the plants with no fertilizer or control which had the lightest corn seeds.

Varietal effect. The weight of seed corn per 5 m^2 plot shows that Native corn produced significantly heavier seed than the other varieties. This is due to characteristic of native corn which has heavier weight compared to other seeds.

Interaction effect. The three corn varieties tested and the different fertilizers used did not significantly interact on the total weight of corn seeds per plot.

Return on Cash Expenses

Table 9 shows the cost and return analysis of three corn varieties applied with organic fertilizers under La Trinidad condition.

Carabao manure had the highest ROCE among the other organic fertilizers used in the study. The three corn varieties applied with chicken dung had the highest ROCE among other organic fertilizers used in the study based on ROCE.

Table 9. Return on cash expenses of three corn varieties applied with organic fertilizers

TREATMENT	YIELD (kg/5 m^2)	GROSS SALES (Php)	TOTAL EXPENSES (Php)	NET INCOME (Php)	ROCE (%)
No fertilizer					
Native corn	2.33	233	61.72	171.23	277.21
Ky Bright Jean	2.09	209	61.77	147.23	238.35
Bighani	1.87	187	61.77	125.23	202.74
Alnus compost					
Native corn	2.83	283	117.19	165.81	141.49
Ky Bright Jean	1.84	184	117.19	66.81	57.01
Bighani	2.21	221	117.19	103.81	88.58
Mushroom compost					
Native corn	2.54	254	76.35	177.65	232.68
Ky Bright Jean	1.92	192	76.35	115.65	151.47
Bighani	2.10	210	76.35	133.65	175.50
Chicken dung					
Native corn	3.50	350	76.77	273.23	335.91
Ky Bright Jean	2.29	229	76.77	152.23	198.29
Bighani	2.34	234	76.77	157.23	204.81
Carabao manure					
Native corn	2.92	292	86.77	205.23	236.52
Ky Bright Jean	2.38	238	86.77	151.23	174..29
Bighani	2.34	234	86.77	147.23	169.68

*Corn seeds sold at Php100.00 per kilo.

*Expenses include alnus compost, mushroom compost, chicken dung, carabao manure, seeds of corn and labor.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The study was conducted at La Trinidad, Benguet to evaluate the growth and yield of different corn varieties; determine the best organic fertilizer materials that could promote vegetative growth and improve seed yield of corn; determine the best combination of corn variety and organic fertilizers on seed production; and determine the economic benefits of producing corn applied with different organic fertilizers.

Among the varieties, native corn was the earliest to produce tassel and silk. In terms of plant height at maturity, Ky Bright Jean was the tallest among the three corn varieties tested. Native corn recorded the heavier weight of marketable corn seeds and Ky Bright Jean the highest weight in terms of weight in non-marketable corn seeds.

Highly significant differences among the varieties were recorded in terms of days from planting to tasseling. Among the varieties, native corn was the earliest to produce tassel and silk. In terms of plant height, Ky Bright Jean was the tallest among the three corn varieties tested. Native corn produced the heavier weight of marketable corn seeds.

Highly significant differences were observed among the different organic fertilizers on the number of days from planting and tasseling/silking. Plants applied with chicken dung were the earliest to tassel and silk. On the height of plant at first ear, it was observed that plants applied with chicken dung produced the tallest at first ears. The plants applied with chicken dung produced the longest and widest corn ear.

Highly significant interaction effect between the varieties and organic fertilizers were observed on the seed width of corn varieties and computed seed yield per hectare.

The combination of corn varieties and organic fertilizers produced significant interactions.

Native corn applied with chicken dung and carabao manure produced the heavier marketable and highest seed yield.

Conclusions

Native corn produced the highest seed yield when applied with organic fertilizers under La Trinidad, Benguet condition.

Native corn applied with chicken dung produced the highest yield and profit under La Trinidad, Benguet condition.

The three corn varieties applied with chicken dung, native corn produced the highest yield and profit under La Trinidad, Benguet condition.

Recommendations

For higher seed yield, application of chicken dung and carabao manure are recommended for corn production in La Trinidad, Benguet. Native corn variety is recommended for high yield and profit. For higher ROCE, native corn applied with chicken dung is recommended.

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APPENDICES

Appendix Table 1. Days from sowing to emergence (80% emergence)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	8	8	8	24	8.00
KY Bright Jean	8	8	8	24	8.00
Bighani	8	8	8	24	8.00
Alnus Compost					
Native corn	9	9	8	26	8.67
KY Bright Jean	8	8	8	24	8.00
Bighani	8	8	8	24	8.00
Mushroom Compost					
Native corn	8	8	8	24	8.00
KY Bright Jean	9	9	9	27	9.00
Bighani	9	8	9	26	8.67
Chicken Dung					
Native corn	8	8	7	23	7.67
KY Bright Jean	9	8	9	26	8.67
Bighani	8	8	8	24	8.00
Carabao Manure					
Native corn	8	7	8	23	7.67
KY Bright Jean	9	8	9	26	8.67
Bighani	8	8	8	24	8.00
TOTAL	125	121	123	369	
GRAND MEAN	8.33	8.07	8.80		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	8.00	8.00	8.00	24.00	8.00
Alnus compost	8.67	8.00	8.00	24.67	8.22
Mushroom compost	8.00	9.00	8.67	25.67	8.56
Chicken dung	7.67	8.67	8.00	24.34	8.11
Carabao manure	7.67	8.67	8.00	24.34	8.11
TOTAL	40.01	42.34	40.67		
MEAN		8.47		8.13	

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	0.578	0.289			
Factor A	4	1.022	0.256	2.09^{ns}	2.71	4.07
Factor B	2	1.911	0.956	2.81^{ns}	3.34	5.45
A x B	8	3.644	0.456	3.73^{**}	2.29	3.23
Error	28	3.422	0.122			
TOTAL	35	4.306				

Coefficient of Variance: 4.48%

Appendix Table 2. Days from emergence to silking/tasseling

VARIETY	REPLICATION			TOTAL	MEAN
	I	II	III		
No fertilizer					
Native corn	7.1	71	71	219	71.00
KY Bright Jean	83	80	76	239	79.67
Bighani	84	70	79	233	77.67
Alnus Compost					
Native corn	71	70	68	209	69.67
KY Bright Jean	78	77	73	228	76.00
Bighani	79	77	77	233	77.67
Mushroom Compost					
Native corn	68	71	71	210	70.00
KY Bright Jean	87	86	71	244	81.34
Bighani	86	78	80	244	81.34
Chicken Dung					
Native corn	66	6	65	195	65.67
KY Bright Jean	67	69	71	207	69.00
Bighani	67	70	69	207	69.00
Carabao Manure					
Native corn	76	70	69	215	71.67
KY Bright Jean	75	74	77	226	75.34
Bighani	75	77	78	232	77.34
TOTAL	1135	1106	1095	3341	
GRAND MEAN	75.67	73.73	73.00		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	24.00	79.67	77.67	231.31	77.11
Alnus compost	69.67	76.00	77.67	223.34	74.45
Mushroom compost	70.00	81.34	81.34	232.68	77.67
Chicken dung	65.67	69.00	69.00	203.67	67.89
Carabao manure	71.67	75.35	77.34	224.35	74.78
TOTAL	351.01	381.36	383.02		
MEAN	70.202	76.27	76.60		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	56.933	28.467			
Factor A	4	508.756	127.189	10.52^{**}	2.71	4.07
Factor B	2	462.933	231.467	19.15^{**}	3.34	5.45
A x B	8	94.178	11.772	0.97^{ns}	2.29	3.23
Error	28	338.400	12.086			
TOTAL	35	4.306				

Coefficient of variance: 4.69%

Appendix Table 3. Days from emergence to maturity

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	138.2	138.9	138.8	415.9	138.64
KY Bright Jean	138.4	138.5	138.7	415.6	138.54
Bighani	138.1	138.8	138.8	415.8	138.60
Alnus Compost					
Native corn	139.1	138.6	139.3	417.0	139.00
KY Bright Jean	139.0	138.7	138.9	416.6	138.87
Bighani	139.4	138.6	138.1	417.1	139.30
Mushroom Compost					
Native corn	138.6	138.7	138.9	416.7	138.90
KY Bright Jean	138.9	138.5	138.4	415.8	138.60
Bighani	139.4	138.5	138.5	417.1	138.50
Chicken Dung					
Native corn	139.1	138.7	138.9	416.7	138.90
KY Bright Jean	138.7	138.8	139.5	416.7	138.90
Bighani	138.4	138.9	139.9	416.6	138.87
Carabao Manure					
Native corn	138.5	138.8	139.1	416.4	138.80
KY Bright Jean	139.9	139.1	138.7	416.7	138.90
Bighani	138.7	138.2	139.2	416.1	138.70
TOTAL	2081.4	2080.30	2085	6246.7	
GRAND MEAN	138.76	138.69	139		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	138.64	138.54	138.60	415.78	138.54
Alnus compost	139.00	188.87	139.03	416.90	138.97
Mushroom compost	135.83	138.60	138.50	415.93	138.64
Chicken dung	138.40	138.90	138.87	116.67	138.89
Carabao manure	138.80	138.90	138.70	416.40	138.90
TOTAL	694.17	693.81	693.70		
MEAN	138.83	138.76	138.74		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	0.942	0.471			
Factor A	4	0.732	0.183	1.35^{ns}	2.71	4.07
Factor B	2	0.046	0.023	0.17^{ns}	3.34	5.45
A x B	8	0.614	0.077	0.56^{ns}	2.29	3.23
Error	28	3.805	0.136			
TOTAL	35	6.139				

Coefficient of variance: 0.27%

Appendix Table 4. Initial height 20 DAP (cm)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	6.6	7.3	6.9	20.8	6.93
KY Bright Jean	6.7	7.1	7.0	20.8	6.93
Bighani	6.8	6.8	7.4	21.4	7.00
Alnus Compost					
Native corn	6.9	6.9	7.1	20.9	6.97
KY Bright Jean	7.2	7.2	7.2	21.6	7.20
Bighani	6.7	7.0	7.0	20.7	6.90
Mushroom Compost					
Native corn	6.5	6.5	7.4	20.4	6.80
KY Bright Jean	7.4	7.4	7.5	22.6	7.53
Bighani	7.4	7.4	6.9	21.0	7.23
Chicken Dung					
Native corn	7.6	8.0	7.5	23.1	7.70
KY Bright Jean	7.6	7.5	7.5	22.6	7.53
Bighani	7.7	7.5	7.5	22.7	7.57
Carabao Manure					
Native corn	7.1	7.0	7.3	21.4	7.13
KY Bright Jean	7.1	7.2	7.1	21.4	7.13
Bighani	6.8	7.2	7.2	21.2	7.07
TOTAL	106.1	108.0	108.50	301.0	
GRAND MEAN	7.07	7.2	7.23		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	6.93	6.93	7.00	20.86	6.95
Alnus compost	6.97	7.20	6.90	21.07	7.02
Mushroom compost	6.80	7.13	7.23	21.56	7.19
Chicken dung	7.70	7.53	7.51	22.80	7.60
Carabao manure	7.13	7.13	7.07	21.33	7.11
TOTAL	35.53	36.32	35.77		
MEAN	7.11	7.26	7.15		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	0.201	0.101			
Factor A	4	2.339	0.585	10.82^{**}	2.71	4.07
Factor B	2	0.185	0.093	1.71^{ns}	3.34	5.45
A x B	8	0.810	0.101	1.88^{ns}	2.29	3.23
Error	28	1.512	0.054			
TOTAL	35	5.048				

Coefficient of variance: 3.24%

Appendix Table 5. Final height (cm)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	121.0	143.0	151.0	415.0	138.33
KY Bright Jean	126.0	113.0	161.0	405.0	135.00
Bighani	107.3	120.8	156.8	384.9	128.30
Alnus Compost					
Native corn	139.0	128.0	125.0	446.0	148.67
KY Bright Jean	143.6	121.0	158.4	193.2	141.07
Bighani	121.4	122.9	172.7	417.0	139.00
Mushroom Compost					
Native corn	131.0	157.0	157.0	445.0	148.33
KY Bright Jean	123.8	153.0	156.6	443.4	144.47
Bighani	113.8	142.1	172.7	413.6	143.87
Chicken Dung					
Native corn	186.0	176.0	173.0	535.0	178.33
KY Bright Jean	180.9	179.8	188.0	519.1	183.03
Bighani	176.5	174.1	174.1	424.7	141.57
Carabao Manure					
Native corn	156.0	174.0	159.0	489.0	163.00
KY Bright Jean	158.5	157.6	160.2	476.3	158.77
Bighani	152.5	127.7	129.6	409.8	136.60
TOTAL	2137.30	2195.00	2395.5	666.5	
GRAND MEAN	142.49	146.33	159.7		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	43.07	42.23	31.23	116.53	38.64
Alnus compost	54.73	49.80	58.43	162.96	54.32
Mushroom compost	58.43	49.50	40.33	148.26	43.42
Chicken dung	77.03	31.87	59.27	208.17	69.39
Carabao manure	65.93	54.40	40.43	166.76	53.59
TOTAL	297.19	267.80	229.63		
MEAN	59.84	53.56	45.94		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F .05	TABULAR F .01
Replication	2	2520.197	1260.099			
Factor A	4	11578.300	2894.575	12.31^{**}	2.71	4.07
Factor B	2	565.669	282.835	1.20^{ns}	3.34	5.45
A x B	8	1107.582	138.448	0.59^{ns}	2.29	3.23
Error	28	6583.902	235.139			
TOTAL	35	22355.650				

Coefficient of variance = 10.26%

Appendix Table 6. Height of plant at first ear (cm)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	38.9	47.4	42.9	129.2	43.07
KY Bright Jean	47.0	32.9	46.8	126.7	42.23
Bighani	25.4	29.4	38.9	93.7	31.23
Alnus Compost					
Native corn	52.0	47.2	65.0	164.2	58.43
KY Bright Jean	57.3	34.6	62.5	149.4	49.80
Bighani	48.8	65.3	61.2	175.3	58.43
Mushroom Compost					
Native corn	48.8	65.3	61.2	175.3	58.43
KY Bright Jean	36.1	56.0	56.4	148.5	71.87
Bighani	33.5	43.8	43.7	121.0	40.33
Chicken Dung					
Native corn	80.7	78.6	63.8	231.1	77.03
KY Bright Jean	76.1	77.2	62.3	215.6	54.40
Bighani	65.6	63.1	49.1	177.8	59.27
Carabao Manure					
Native corn	72.7	68.7	56.4	197.8	65.93
KY Bright Jean	56.1	55.7	51.4	163.2	54.40
Bighani	49.7	35.1	36.5	121.3	40.43
TOTAL	796.7	800.30	798.10	2390.1	
GRAND MEAN	53.11	53.35	53.21		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	43.07	42.23	31.23	116.53	38.64
Alnus compost	54.73	49.80	58.43	162.96	54.32
Mushroom compost	58.43	49.50	40.33	148.26	49.42
Chicken dung	77.03	71.87	59.27	208.17	69.39
Carabao manure	65.93	54.40	40.43	160.76	53.59
TOTAL	299.19	267.80	229.69		
MEAN	59.84	53.56	45.94		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F .05	TABULAR F .01
Replication	2	9.403	4.702			
Factor A	4	4645.147	1161.287	13.92^{**}	2.71	4.07
Factor B	2	2725.230	1362.615	16.34^{ns}	3.34	5.45
A x B	8	189.488	23.686	0.28^{ns}	2.29	3.23
Error	28	2335.290	83.403			
TOTAL	35	9904.558				

Coefficient of variance = 17.73%

Appendix Table 7. Length of corn ear (cm)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	11.4	11.2	11.0	33.6	11.20
KY Bright Jean	12.5	14.3	14.0	40.8	13.60
Bighani	13.1	13.8	14.8	41.7	13.90
Alnus Compost					
Native corn	10.2	10.3	9.3	30.3	10.10
KY Bright Jean	14.6	10.6	10.2	35.5	11.80
Bighani	13.5	15.0	15.9	44.4	14.80
Mushroom Compost					
Native corn	11.4	10.7	10.5	32.6	10.87
KY Bright Jean	15.0	14.0	13.9	42.9	14.30
Bighani	15.8	13.9	14.0	43.7	14.50
Chicken Dung					
Native corn	13.8	10.7	15.2	39.7	13.23
KY Bright Jean	16.5	18.8	29.3	54.6	18.20
Bighani	8.8	19.3	18.9	57.0	19.00
Carabao Manure					
Native corn	13.8	11.1	11.0	35.9	11.97
KY Bright Jean	17.2	15.6	15.9	48.7	16.23
Bighani	16.0	16.2	16.4	48.6	16.20
TOTAL	213.6	205.5	230.3		
GRAND MEAN	14.24	13.7	14.69	630	

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	11.20	13.60	13.90	38.70	12.90
Alnus compost	10.10	11.80	14.80	36.70	12.23
Mushroom compost	10.81	14.30	14.56	39.73	13.24
Chicken dung	13.23	18.20	19.00	50.13	16.81
Carabao manure	11.97	16.23	16.20	44.40	14.8
TOTAL	57.37	74.13	78.46		
MEAN	11.47	14.83	15.69		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F .05	TABULAR F .01
Replication	2	2.212	1.106			
Factor A	4	122.785	30.696	20.54^{**}	2.71	4.07
Factor B	2	151.557	75.779	50.73^{**}	3.34	5.45
A x B	8	17.989	2.249	1.50^{ns}	2.29	3.23
Error	28	41.828	1.494			
TOTAL	35	336.372				

Coefficient of variance: 8.74%

Appendix Table 8. Ear diameter (cm)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	4.6	4.7	4.6	13.9	4.63
KY Bright Jean	5.1	4.7	4.9	14.7	4.90
Bighani	5.2	4.8	5.0	15.0	5.00
Alnus Compost					
Native corn	4.7	5.0	4.7	14.4	4.80
KY Bright Jean	5.0	4.6	4.9	14.5	4.83
Bighani	5.1	4.7	4.8	14.6	4.87
Mushroom Compost					
Native corn	5.1	4.8	4.9	14.6	4.87
KY Bright Jean	5.3	4.9	5.1	15.3	5.10
Bighani	5.4	5.2	4.9	15.5	5.17
Chicken Dung					
Native corn	5.2	5.2	4.6	15.0	5.00
KY Bright Jean	5.7	5.6	5.7	17.0	5.67
Bighani	6.1	5.5	5.6	17.2	5.73
Carabao Manure					
Native corn	4.7	4.6	5.6	17.0	5.67
KY Bright Jean	5.0	5.0	4.9	14.9	4.97
Bighani	5.2	4.8	4.9	14.9	4.97
TOTAL	77.4	74.10	75.10	228.5	
GRAND MEAN	5.16	4.94	5.01		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	4.63	4.90	5.00	14.53	4.84
Alnus compost	4.80	4.83	5.10	14.50	4.83
Mushroom compost	4.87	5.10	5.17	15.14	5.05
Chicken dung	5.00	5.67	5.73	16.40	5.45
Carabao manure	5.67	4.93	25.74	15.61	5.20
TOTAL	24.97	25.97	25.74		
MEAN	4.99	5.09	5.15		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F .05	TABULAR F .01
Replication	2	0.470	0.235			
Factor A	4	2.617	0.654	24.86**	2.71	4.07
Factor B	2	1.003	0.504	19.06**	3.34	5.45
A x B	8	0.472	0.059	2.24ns	2.29	3.23
Error	28	0.737	0.026			
TOTAL	35	5.299				

ns = Not significant
** = Highly significant

Coefficient of variance = 3.23%

Appendix Table 9. Seed width (mm)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	8.8	8.8	8.7	26.3	8.77
KY Bright Jean	8.9	8.9	8.7	26.5	8.83
Bighani	8.8	8.8	8.8	26.8	8.80
Alnus Compost					
Native corn	8.8	8.6	8.0	26.0	8.67
KY Bright Jean	8.8	8.8	8.8	26.4	8.80
Bighani	8.9	9.0	8.9	26.8	8.93
Mushroom Compost					
Native corn	8.7	8.7	8.7	26.1	8.70
KY Bright Jean	8.8	8.8	8.8	26.4	8.80
Bighani	9.0	9.0	8.9	26.4	8.97
Chicken Dung					
Native corn	8.6	8.7	8.8	26.1	8.70
KY Bright Jean	9.0	8.9	8.9	26.8	8.93
Bighani	9.1	9.0	9.1	27.1	9.03
Carabao Manure					
Native corn	8.9	8.8	8.8	26.5	8.83
KY Bright Jean	8.8	8.8	8.9	26.5	8.83
Bighani	8.8	8.9	8.9	26.6	8.87
TOTAL	132.70	132.50	132.30	397.4	
GRAND MEAN	8.85	8.83	8.82		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	8.77	8.83	8.80	26.4	8.80
Alnus compost	8.67	8.80	8.93	26.4	8.80
Mushroom compost	8.70	8.80	8.97	26.47	8.82
Chicken dung	8.70	8.93	9.03	26.93	8.98
Carabao manure	8.81	8.83	8.87	26.53	8.84
TOTAL	47.67	44.19	44.87		
MEAN	8.73	8.84	8.97		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	0.005	0.003			
Factor A	4	0.062	0.016	3.59*	2.71	4.07
Factor B	2	0.281	0.141	32.46**	3.34	5.45
A x B	8	0.150	0.019	4.32**	2.29	3.23
Error	28	0.121	0.004			
TOTAL	35	0.620				

* = Significant

** = Highly significant

Coefficient of variance = 0.75%

Appendix Table 10. Seed length (mm)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	10.7	10.4	10.8	31.9	10.63
KY Bright Jean	12.4	11.8	12.0	36.2	12.07
Bighani	13.8	13.7	13.8	41.3	13.77
Alnus Compost					
Native corn	10.7	10.4	10.4	31.5	10.50
KY Bright Jean	12.0	11.7	12.0	35.7	11.90
Bighani	13.8	13.6	13.8	41.2	13.73
Mushroom Compost					
Native corn	10.6	10.6	10.4	36.1	10.53
KY Bright Jean	11.7	11.6	12.2	35.5	11.83
Bighani	13.7	13.8	13.8	41.3	13.77
Chicken Dung					
Native corn	10.7	10.7	10.5	31.9	10.63
KY Bright Jean	12.2	12.2	11.9	36.7	12.10
Bighani	13.9	13.9	13.9	41.7	13.90
Carabao Manure					
Native corn	10.4	10.3	10.4	31.1	10.37
KY Bright Jean	10.7	11.8	11.4	33.9	11.30
Bighani	11.7	13.70	13.6	39.0	13.00
TOTAL	179.00	180.20	180.9	340.6	
GRAND MEAN	11.93	12.01	12.06		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	10.63	12.07	13.77	36.47	12.06
Alnus compost	10.50	11.90	13.73	36.13	12.04
Mushroom compost	10.53	11.83	13.77	36.13	12.04
Chicken dung	10.63	12.10	13.90	36.63	12.21
Carabao manure	10.37	11.30	13.00	34.67	11.55
TOTAL	56.66	59.20	68.17		
MEAN	10.53	11.84	13.63		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	0.123	0.062			
Factor A	4	2.432	0.608	4.48**	2.71	4.07
Factor B	2	72.667	36.334	267.94**	3.34	5.45
A x B	8	0.511	0.064	0.47ns	2.29	3.23
Error	28	3.707	0.136			
TOTAL	35	79.530				

ns = Not significant

** = Highly significant

Coefficient of variance = 3.07%

Appendix Table 11. Weight of marketable seed/plot (kg)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	2.25	2.38	2.38	7.01	2.34
KY Bright Jean	2.50	2.25	1.88	5.91	1.84
Bighani	2.23	2.38	2.25	6.88	2.29
Alnus Compost					
Native corn	2.25	2.13	1.88	6.28	2.09
KY Bright Jean	3.00	2.38	2.25	7.63	2.54
Bighani	2.75	2.13	2.13	7.01	2.34
Mushroom Compost					
Native corn	2.38	1.30	2.00	5.68	1.89
KY Bright Jean	2.25	1.88	1.63	5.76	1.92
Bighani	3.00	2.88	2.88	8.76	2.92
Chicken Dung					
Native corn	2.88	3.25	2.38	8.51	1.84
KY Bright Jean	2.50	2.13	2.25	6.88	2.29
Bighani	2.25	2.75	2.18	7.13	2.38
Carabao Manure					
Native corn	2.50	1.88	1.13	5.51	1.84
KY Bright Jean	3.63	3.38	3.50	10.51	3.50
Bighani	2.50	2.38	2.18	7.01	2.34
TOTAL	37.87	30.97	32.90	106.56	
GRAND MEAN	138.76	138.69	2.19		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	2.34	1.84	2.29	6.47	2.15
Alnus compost	2.09	2.54	2.34	6.97	2.32
Mushroom compost	1.89	1.92	2.92	6.73	2.24
Chicken dung	1.89	2.29	2.38	6.56	2.18
Carabao manure	1.84	3.50	2.34	7.68	2.58
TOTAL	10.05	12.09	12.27		
MEAN	2.01	2.41	2.45		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	0.876	0.438			
Factor A	4	1.641	0.410	3.61*	2.71	4.07
Factor B	2	3.776	1.888	16.64**	3.34	5.45
A x B	8	0.822	0.103	0.90ns	2.29	3.23
Error	28	3.176	0.113			
TOTAL	35					

* = Significant

** = Highly significant

ns = Not significant

Coefficient of variance = 14.32%

Appendix Table 12. Weight of non-marketable seed/plot (kg)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	0.50	0.13	0.25	0.88	0.29
KY Bright Jean	0.25	0.13	0.13	0.50	0.17
Bighani	0.25	0.13	0.13	0.50	0.17
Alnus Compost					
Native corn	0.75	0.25	0.25	1.25	0.47
KY Bright Jean	0.50	0.13	0.13	0.75	0.25
Bighani	0.25	0.13	0.13	0.50	0.17
Mushroom Compost					
Native corn	0.75	0.25	0.25	1.25	0.47
KY Bright Jean	0.25	0.13	0.13	0.50	0.17
Bighani	0.25	0.13	0.50	0.86	0.29
Chicken Dung					
Native corn	0.50	0.25	1.00	1.75	0.58
KY Bright Jean	0.13	0.13	0.25	0.50	0.17
Bighani	0.25	0.13	0.13	0.50	0.17
Carabao Manure					
Native corn	0.50	0.13	0.13	0.75	0.25
KY Bright Jean	0.25	0.25	0.13	0.62	0.21
Bighani	0.25	0.13	0.13	0.50	0.17
TOTAL	5.63	2.43	3.61	11.61	
GRAND MEAN	0.38	0.16	0.24		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	0.29	0.17	0.17	0.63	0.21
Alnus compost	0.47	0.25	0.17	0.89	0.30
Mushroom compost	0.47	0.17	0.29	0.93	0.31
Chicken dung	0.58	0.17	0.17	0.92	0.31
Carabao manure	0.25	0.21	0.17	0.63	0.21
TOTAL	2.06	0.97	0.97		
MEAN	0.41	0.19	0.19		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F .05	TABULAR F .01
Replication	2	0.355	0.177			
Factor A	4	0.067	0.017	0.69^{ns}	2.71	4.07
Factor B	2	0.384	0.192	$7.8/2^{**}$	3.34	5.45
A x B	8	0.189	0.024	0.96^{ns}	2.29	3.23
Error	28	0.687	0.025			
TOTAL	35	1.682				

^{ns} = Not significant

** = Highly significant

Coefficient of variance = 10.40%

Appendix Table 13. Computed seed yield per plot/ha (kg)

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	4.50	4.75	4.75	14.00	14.67
KY Bright Jean	5.00	4.50	3.75	15.25	4.42
Bighani	4.50	4.75	4.50	13.75	4.58
Alnus Compost					
Native corn	4.50	4.25	3.75	12.30	4.11
KY Bright Jean	6.00	4.75	4.50	15.25	3.08
Bighani	5.50	4.25	4.25	14.00	4.68
Mushroom Compost					
Native corn	4.75	2.25	4.00	11.00	5.67
KY Bright Jean	4.50	3.75	3.25	11.50	3.83
Bighani	6.00	5.75	5.75	17.50	5.83
Chicken Dung					
Native corn	5.75	6.50	4.75	11.00	5.67
KY Bright Jean	5.00	4.25	4.50	13.75	4.58
Bighani	4.50	5.50	4.25	14.25	4.75
Carabao Manure					
Native corn	5.00	3.75	2.25	11.00	3.67
KY Bright Jean	7.63	6.75	7.00	21.38	7.13
Bighani	5.00	4.75	4.25	14.00	4.68
TOTAL	78.13	70.5	65.5	208.13	
GRAND MEAN	5.21	4.7	4.37		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	4.67	4.42	4.58	13.67	4.55
Alnus compost	4.17	5.08	4.68	13.93	4.64
Mushroom compost	3.67	3.83	5.89	13.33	4.44
Chicken dung	5.67	4.58	4.75	15.00	5.00
Carabao manure	3.67	7.13	4.69	15.48	5.16
TOTAL	21.85	25.04	24.52		
MEAN	1.37	5.00	4.90		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F .05	TABULAR F .01
Replication	2	5.390	2.695			
Factor A	4	9.388	2.347	6.97**	2.71	4.07
Factor B	2	19.206	9.603	28.50**	3.34	5.45
A x B	8	5.846	0.731	2.17*	2.29	3.23
Error	28	9.433	0.337			
TOTAL	35	49.263				

** = Highly significant
* = Significant

Coefficient of variance = 12.20%

Appendix Table 14. Reaction to corn borer

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
No fertilizer					
Native corn	1	1	1	3	1.00
KY Bright Jean	2	1	2	5	1.00
Bighani	1	1	1	3	1.00
Alnus Compost					
Native corn	2	2	2	5	1.67
KY Bright Jean	1	1	1	3	1.00
Bighani	1	1	1	3	1.00
Mushroom Compost					
Native corn	2	1	1	5	1.67
KY Bright Jean	1	1	1	3	1.00
Bighani	2	1	1	4	1.33
Chicken Dung					
Native corn	1	2	2	4	1.33
KY Bright Jean	1	1	1	3	1.00
Bighani	2	1	1	4	1.33
Carabao Manure					
Native corn	2	1		5	1.67
KY Bright Jean	1	1	1	3	1.00
Bighani	1	1	1	3	1.00
TOTAL	21	17	17	56	
GRAND MEAN	14	1.13	1.13		

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	1.00	1.67	1.00	3.67	1.22
Alnus compost	1.67	1.00	1.00	3.67	1.22
Mushroom compost	1.67	1.00	1.33	4.00	1.33
Chicken dung	1.33	1.00	1.33	3.66	1.22
Carabao manure	1.67	1.00	1.00	3.67	1.22
TOTAL	7.34	5.67	4.66		
MEAN	1.47	1.34	0.93		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F .05	TABULAR F .01
Replication	2	0.533	0.267			
Factor A	4	0.133	0.033	0.19^{ns}	2.71	4.07
Factor B	2	0.933	0.467	2.72^{ns}	3.34	5.45
A x B	8	2.400	0.300	1.75^{ns}	2.29	3.23
Error	28	4.800	0.171			
TOTAL	35	8.800				

ns = Not significant

Coefficient of variance = 12.23%

Appendix Table 15. Reaction to downy mildew

VARIETY	REPLICATION I	II	III	TOTAL	MEAN
Native Corn					
Control	1	1	2	4	1.33
Alnus compost	1	1	1	3	1.00
Mushroom compost	2	1	1	4	1.33
Chicken dung	1	2	1	4	1.33
Carabao manure	1	1	1	3	1.00
Ky Bright Jean					
Control	2	1	1	4	1.33
Alnus compost	1	2	2	5	1.67
Mushroom compost	1	1	1	3	1.00
Chicken dung	1	1	1	3	1.00
Carabao manure	1	1	2	4	1.33
Bighani					
Control	1	1	1	3	1.00
Alnus compost	1	1	1	3	1.00
Mushroom compost	1	2	1	4	1.33
Chicken dung	1	1	1	3	1.00
Carabao manure	1	1	1	3	1.00
TOTAL					

TWO-WAY TABLE

TREATMENT	NATIVE CORN	KY BRIGHTNESS	BIGHANI	TOTAL	MEAN
Control	1.33	1.33	1.00	3.66	1.22
Alnus compost	1.00	1.67	1.00	3.67	1.22
Mushroom compost	1.33	1.00	1.33	3.66	1.22
Chicken dung	1.33	1.00	1.00	3.33	1.11
Carabao manure	1.00	1.33	1.00	3.33	1.11
TOTAL	5.99	6.33	5.33		
MEAN	1.20	1.27	1.07		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARE	COMPUTED F	TABULAR F .05	TABULAR F .01
Replication	2	0.311	0.156			
Factor A	4	0.222	0.056	0.16^{ns}	2.71	4.07
Factor B	2	0.844	0.422	1.22^{ns}	3.34	5.45
A x B	8	2.711	0.339	0.97^{ms}	2.29	3.23
Error	28	9.689	0.346			
TOTAL	35	13.778				

ns = Not significant Coefficient of variance = 11.38%